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Young Nam Kim

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MARTINEZ, BRITTANY M

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/587,625	Applicant(s) KIM, YOUNG NAM	
	Examiner BRITTANY M. MARTINEZ	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 March 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-12,17-19 and 21-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-12,17-19 and 21-23 is/are rejected.
- 7) ☒ Claim(s) 21 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of Application

Applicant's arguments/remarks and amendment filed March 30, 2010, have been carefully considered. **Claims 1, 2, 4-12, 17-19 and 21-23** are pending in the instant application, with **Claims 1, 4-11 and 17-19** amended and **Claims 21-23** added. **Claims 3, 13-16 and 20** have been cancelled. **Claims 1, 2, 4-12, 17-19 and 21-23** have been examined.

Claim Objections

1. **Claim 21** is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The "Y-branched carbon nanotubes prepared having at least one Y-junction" of **Claim 21** fails to further limit the Y-branched carbon nanotubes of **Claim 1**.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

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2. **Claim 22** is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the original specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. There does not appear to be support for newly added **Claim 22**. Applicant points to original **Claim 14** and page 3, lines 1-2 of the original specification for support for **Claim 22**, but original **Claim 14** is merely drawn to Y-branched carbon nanotubes prepared by a process according to preceding claims and characterized by multiple Y-junctions repeated twice or more, and page 3, lines 1-2 of the original specification merely discloses carbon nanotubes grown from more than one Y-junction on a linear carbon nanotube to form a tree-like structure. There is no support in the original disclosure for a process comprising a step (d) which uses carbon nanotubes obtained from step (c) as a carrier and repeats (a), (b), (c) at least twice, whereby the obtained Y-branched carbon nanotubes are tree-shaped multiple Y-branched carbon nanotubes.

3. **Claim 22** is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the original specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The subject matter of **Claim 22** is not commensurate in scope with that of the original specification. Applicant points to original **Claim 14** and page 3, lines 1-2 of the original specification for support for **Claim 22**, but original **Claim 14** is merely drawn to

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Y-branched carbon nanotubes prepared by a process according to preceding claims and characterized by multiple Y-junctions repeated twice or more, and page 3, lines 1-2 of the original specification merely discloses carbon nanotubes grown from more than one Y-junction on a linear carbon nanotube to form a tree-like structure. There is no enabling disclosure for a process comprising a step (d) which uses carbon nanotubes obtained from step (c) as a carrier and repeats (a), (b), (c) at least twice, whereby the obtained Y-branched carbon nanotubes are tree-shaped multiple Y-branched carbon nanotubes.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. **Claim 1** is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

2. **Claim 1** recites the limitation "the catalyst-loaded carbon nanotubes prepared from step (a)" in the 4th line of the claim. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102/103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

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4. **Claims 1, 2, 4-9, 12, 17-19 and 21-23** are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Tsai et al. (*Carbon*) (of record).

5. With regard to **Claim 1**, Tsai discloses a process for preparing Y-branched carbon nanotubes comprising the steps of: (a) loading a catalyst on a carbon nanotube carrier; (b) pre-treating the catalyst-loaded carbon nanotubes prepared from step (a) to have the catalyst bonded to the surface of the carbon nanotubes; and (c) performing a synthetic reaction of new carbon nanotubes using the pretreated carbon nanotubes of step (b) (Tsai, Fig. 1-3; p. 1900-1901).

6. With regard to **Claim 2**, Tsai discloses the carbon nanotube carrier being a carbon nanotube or carbon nanofiber (Tsai, Fig. 1-3; p. 1900-1901).

7. With regard to **Claims 4 and 5**, Tsai discloses using nanocrystalline Pd as the catalyst (Tsai, Fig. 1-3; p. 1900-1901).

8. With regard to **Claim 6**, Tsai discloses the step of loading a catalyst carried out by chemical vapor deposition (Tsai, Fig. 1-3; p. 1900-1901).

9. With regard to **Claims 7 and 17**, Tsai discloses the tight bonding between the catalyst and the surface of carbon nanotubes accomplished by a chemical pre-treatment such as oxidation, reduction, or hydrogenation, or a physical pre-treatment such as high temperature treatment (the actual growth of the initial nanotube from the catalyst particle) (Tsai, Fig. 1-3; p. 1900-1901).

10. With regard to **Claims 8 and 18**, Tsai discloses the tight bonding between the catalyst and the surface of carbon nanotubes caused by decomposition, damage or

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destruction of the surface of the carbon nanotubes (the actual growth of the initial nanotube from the catalyst particle) (Tsai, Fig. 1-3; p. 1900-1901).

11. With regard to **Claims 9 and 19**, Tsai discloses the synthetic reaction performed using a suspension in which the catalyst-loaded carbon nanotubes are dispersed in solvent (ethanol) (Tsai, p. 1901).

12. With regard to **Claim 12**, Tsai discloses the synthetic reaction performed by chemical vapor deposition or plasma method (Tsai, Fig. 1-3; p. 1900-1901).

13. With regard to **Claim 21**, Tsai discloses the Y-branched carbon nanotubes prepared having at least one Y-junction (Tsai, Fig. 1-3; p. 1900-1901).

14. With regard to **Claim 22**, Tsai discloses tree-shaped multiple Y-branched carbon nanotubes (Tsai, Fig. 1-3; p. 1900-1901). While Tsai does not explicitly disclose a process comprising a step (d) which uses carbon nanotubes obtained from step (c) as a carrier and repeats (a), (b), (c) at least twice, there is no support for such a process in the original disclosure. Thus, Tsai discloses a process comprising a step (d) which uses carbon nanotubes obtained from step (c) as a carrier and repeats (a), (b), (c) at least twice, whereby the obtained Y-branched carbon nanotubes are tree-shaped multiple Y-branched carbon nanotubes to no less an extent than the instant application.

15. With regard to **Claim 23**, Tsai discloses the synthetic reaction performed to grow branches of the new carbon nanotubes at the position where the catalyst is bonded (Tsai, Fig. 1-3; p. 1900-1901).

16. **Claims 1, 2, 4-9, 12, 17-19 and 21-23** are also obvious over Tsai because anticipation is the epitome of obviousness.

Claim Rejections - 35 USC § 103

17. **Claims 10 and 11** are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai et al. (*Carbon*) as applied to **Claims 1 and 9** above, and further in view of Kishi et al. (US 6,869,581 B2), as applied in the previous Office action.

Response to Amendment

Applicant's amendment filed March 30, 2010, with regard to the Claims has been fully considered and is accepted. The Claim Objections of the previous Office action have been withdrawn. The 35 U.S.C. 112, second paragraph, rejection of **Claims 3-6, 10, 11, 13 and 14** of the previous Office action has been withdrawn. **Claim 1** remains rejected under 35 U.S.C. 112, second paragraph, as can be seen above. Applicant's amendment filed March 30, 2010, necessitated the new Claim Objection and 35 U.S.C. 112 rejections seen above.

Response to Arguments

18. Applicant's arguments filed March 30, 2010, have been fully considered but they are not persuasive. Applicant's argument that Tsai does not disclose the use of pre-existing CNTs as a carrier, and does not go through a pre-treatment stage to bind a catalyst to CNTs (Applicant's Response, 3/30/2010, p. 6) is not convincing. First, **Claim 1** does not require the use of pre-existing CNTs as a carrier. **Claim 1** merely requires the use of a carbon nanotube carrier. A carbon nanotube can be interpreted as something that carriers/supports carbon nanotubes and thus, can be any kind of

substrate. **Claim 1**, as written, does not require the carbon nanotube carrier to be made of carbon nanotubes. In any event, Tsai could still be interpreted to teach a carbon nanotube carrier made of carbon nanotubes. Looking at Fig. 3 of Tsai, step (a) could be considered the loading and pretreating step. The picture to the right of the (a) arrow could be considered a depiction of a carbon nanotube carrier made of carbon nanotubes.

19. Applicant's argument that Tsai does not disclose synthesizing Y-branched CNTs using the pretreated CNTs that are bonded with a catalyst (Applicant's Response, 3/30/2010, p. 6) is not convincing. Step (b) of Fig. 3 of Tsai would cover such limitation.

20. Applicant's argument that Tsai does not disclose catalyst loading via chemical vapor deposition (Applicant's Response, 3/30/2010, p. 6-7) is not convincing. Since Applicants indicate that catalyst loading can be carried out via chemical vapor deposition (**Claim 6**), the chemical vapor deposition process of growing the initial nanotubes from the catalyst to "load" the catalyst (step (a) of Fig. 3 of Tsai) would cover such limitation. **Claim 6** does not require chemical vapor deposition of catalytic metals on a substrate. **Claim 6** merely requires chemical vapor deposition.

21. Applicant's argument that the instant claims relate to synthesizing CNTs by dispersing catalyst-loaded CNTs in a solvent and using the solvent itself as a carbon source during CNT synthesis (Applicant's Response, 3/30/2010, p. 7) is not convincing. It is noted that the features upon which Applicant relies are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from

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the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

22. Applicant's argument that the present invention is different from Kishi (Applicant's Response, 3/30/2010, p. 8) is not convincing. Kishi was only used to illustrate that the use of particular surfactants in carbon nanotube dispersions is well-known in the art.

Conclusion

23. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRITTANY M. MARTINEZ whose telephone number is

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(571) 270-3586. The examiner can normally be reached on Monday-Friday 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Wayne Langel/
Primary Examiner, Art Unit 1793

BMM
/Brittany M Martinez/
Examiner, Art Unit 1793